

AMENDMENTS TO THE CLAIMS:

This listing of the claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-34 (canceled)

35. (currently amended) A method of detecting a target polynucleotide which comprises the steps of:

a) contacting a target polynucleotide having a first portion and a second portion immediately contiguous to one another with:

i) an invader oligonucleotide, at least a part of which is capable of specifically hybridizing to the first portion of the target polynucleotide;

ii) a first probe oligonucleotide comprising a first region that is capable of specifically hybridizing to the second portion of the target polynucleotide and an unpaired region located adjacent to the first region; and

iii) a reagent that is capable of cleaving to release the unpaired region of the first probe oligonucleotide to produce a cleaved unpaired region when the probe oligonucleotide is hybridized to the second portion of the target polynucleotide and the invader oligonucleotide is hybridized to the first portion of the polynucleotide wherein said reagent comprises a 5' nuclease;

under conditions wherein said first probe oligonucleotide is cleaved to produce said cleaved unpaired region, and wherein a second cleavage structure cleavable by said reagent is formed, said second cleavage structure comprising said cleaved unpaired region and a second probe oligonucleotide, wherein said second cleavage structure is formed when said cleaved unpaired region is hybridized to said second probe, or when said cleaved unpaired region and said second probe oligonucleotide are both hybridized to a second target polynucleotide, and wherein said second cleavage structure is cleaved by the reagent to provide a cleaved second probe;

b) detecting the accumulation of the cleaved second probe; and

c) determining whether the cleaved second probe accumulates exponentially over time, wherein said exponential accumulation of ~~the~~ cleaved second probe over time is indicative of the presence of said target nucleic acid.

36-46 (canceled)

47. (currently amended) The method of Claim 35 wherein said detecting the accumulation of ~~the~~ cleaved second probe comprises detection of fluorescence or phosphorescence.

48-61 (canceled)

62. (currently amended) A method for detecting the presence of a target nucleic acid molecule in a sample, comprising:

a) incubating a sample with a cleavage agent under conditions wherein a first cleavage structure is formed, said first cleavage structure comprising:

i) a ~~first~~ target nucleic acid, said ~~first~~ target nucleic acid comprising a first region and a second region, said second region upstream of and contiguous to said first region;

ii) a first nucleic acid molecule comprising a first portion that is completely complementary the second region of the ~~first~~ target nucleic acid;

iii) a second nucleic acid molecule comprising a 3' portion and a 5' portion, wherein said 5' portion is completely complementary to said first region of said ~~first~~ target nucleic acid;

wherein said 5' portion of said second nucleic acid molecule is annealed to said first region of said ~~first~~ target nucleic acid and wherein at least a portion of said first nucleic acid molecule is annealed to said second region of said ~~first~~ target nucleic acid,

b) cleaving said first cleavage structure with a cleavage agent comprising a 5' nuclease so as to generate non-target cleavage product under conditions wherein a second cleavage structure is formed, said second cleavage structure comprising:

- i) said non-target cleavage product;
- ii) a probe oligonucleotide;

wherein said second cleavage structure is formed when said non-target cleavage product is hybridized to said probe oligonucleotide, or when said non-target cleavage product and said probe oligonucleotide are both hybridized to a second target nucleic acid,

- c) cleaving said second cleavage structure with said cleavage agent so as to generate a cleaved probe, wherein said cleaved probe accumulates at an exponential rate over time, and wherein the accumulation of said cleaved probe at an exponential rate over time indicates the presence of said target nucleic acid in said sample; and
- d) detecting said cleaved probe at a plurality of timepoints.

63. (previously presented) The method of Claim 62, wherein said detecting said cleaved probe comprises detection of fluorescence.

64. (withdrawn) The method of Claim 62, wherein said detecting said cleaved probe comprises detection of mass.

65. (previously presented) The method of Claim 62, wherein said detecting said cleaved probe comprises detection of fluorescence energy transfer.

66. (previously presented) The method of Claim 62, wherein said detecting said cleaved probe comprises detection selected from the group consisting of detection of radioactivity, luminescence, phosphorescence, fluorescence polarization, and charge.

67. (canceled)

68. (currently amended) The method of Claim ~~67~~ 62, wherein said 5' nuclease is thermostable.
69. (withdrawn) The method of Claim 68, wherein said thermostable 5' nuclease comprises a 5' nuclease of a DNA polymerase.
70. (withdrawn) The method of Claim 69, wherein said DNA polymerase is Taq DNA polymerase.
71. (previously presented) The method of Claim 62, wherein said 3' portion of said second nucleic acid molecule consists of a single nucleotide.
72. (withdrawn) The method of Claim 71, wherein said single nucleotide is complementary to said target nucleic acid.
73. (previously presented) The method of Claim 62, wherein a plurality of said first nucleic acid molecule is provided, such that said first nucleic acid molecule is in concentration excess compared to said target nucleic acid.
74. (withdrawn) The method of Claim 62, wherein a plurality of said second nucleic acid molecule is provided, such that said second nucleic acid molecule is in concentration excess compared to said target nucleic acid.
75. (withdrawn) The method of Claim 62, wherein said target nucleic acid and said second nucleic acid molecule form a duplex, and wherein a plurality of said first nucleic acid molecule is provided such that said first nucleic acid molecule is in concentration excess compared to said duplex.
76. (withdrawn) The method of Claim 75, wherein said cleaving said cleavage structure comprises cleaving said first nucleic acid molecule to generate non-target cleavage product.

77. (withdrawn) The method of Claim 76, wherein said non-target cleavage product from said first nucleic acid molecule is generated in concentration excess compared to said duplex.

78. (previously presented) The method of Claim 68, wherein said thermostable 5' nuclease is a FEN-1 nuclease.

79. (previously presented) The method of Claim 78, wherein said FEN-1 nuclease is a FEN-1 nuclease from an archaeobacterial species.

80. (previously presented) The method of Claim 79, wherein said FEN-1 nuclease is selected from the group consisting of *Methanococcus jannaschii* FEN-1 and *Pyrococcus furiosus* FEN-1.

81. (previously presented) The method of Claim 35, wherein said reagent is a thermostable 5' nuclease.

82. (previously presented) The method of Claim 81, wherein said thermostable 5' nuclease is a FEN-1 nuclease.

83. (previously presented) The method of Claim 82, wherein said FEN-1 nuclease is a FEN-1 nuclease from an archaeobacterial species.

84. (previously presented) The method of Claim 83, wherein said FEN-1 nuclease is selected from the group consisting of *Methanococcus jannaschii* FEN-1 and *Pyrococcus furiosus* FEN-1.